APPLICATION

FOR

UNITED STATES LETTERS PATENT

ENTITLED

METHODS AND SYSTEMS FOR NETWORKED CAMERA CONTROL

TO WHOM IT MAY CONCERN:

BE IT KNOWN THAT (1) Peter A. Mottur and (2) Ethan Z. Zimmer
of (1) 430 Black Point Lane, Portsmouth, RI 02871 and (2) 89
Overhill Road, East Greenwich, Rhode Island, 02818, invented
certain new and useful improvements entitled as set forth above
of which the following is a specification:

PATENT GROUP
FOLEY, HOAG & ELIOT LLP
ONE POST OFFICE SQUARE
BOSTON, MA 02109-2170
TEL: 617-832-1000
FAX: 617-832-7000

2

3   METHODS AND SYSTEMS FOR NETWORKED CAMERA CONTROL

4

5   CLAIM OF PRIORITY

6   This application claims priority to U.S.S.N. 60/221,674,

7   entitled "Systems And Methods For Delivering Live Action Feeds

8   Over A Computer Network", filed on July 26, 2000, naming Peter

9   Mottur and Ethan Z. Zimmer as inventors, the contents of which

10   are herein incorporated by reference in their entirety.

11

12   BACKGROUND

13   (1) Field

14   The disclosed methods and systems relate generally to

15   delivering content over a computer network, and more particularly

16   to providing content related to live action feeds controlled over

17   the network by network users.

18   (2) Description of Relevant Art

19   The internet provides a platform for allowing the

20   distribution of information and data such as multimedia data.

21   Accordingly, one internet application includes broadcasting

22   multimedia entertainment and other live action programming.

23   Several internet websites exist that allow users to obtain live

24   action programming that can be streamed throughout the internet

25   to internet users. These websites can be integrated with one or

26   more cameras, otherwise known as "webcams," that can be located

1   at locations to capture a particular field of view. Internet

2   users having an internet browser with the necessary plug-ins or

3   software applications, can receive the broadcast image data from

4   the fixed camera locations. For example, websites can include

5   points of views for major landmarks or other central locations in

6   various cities to allow internet users to view the weather or

7   scenery in the camera field of view. Other websites can utilize

8   the fixed field of view to capture, for example, commonly

9   congested traffic areas. Unfortunately, in the latter example,

10   there could be a traffic problem at another area on a given day,

11   that is not within the field of view. The information or data

12   provided from the fixed field of view therefore may not provide

13   sufficient information to a user on a given day. In other

14   applications, a camera can be used to view or monitor a moving

15   subject. If the subject moves outside the camera field of view,

16   the monitoring user may not be able to perform the monitoring

17   function. Some systems provide limited control of camera motion,

18   but such control can be particular to a specific individual,

19   user, and/or network location or device, and such control can

20   also be extremely limited to discrete camera movements.

21   Furthermore, many multimedia broadcasts include significant

22   delays between image updates, resulting in choppy broadcasts that

23   can appear to be, or may be, a string of static images that are

24   presented with a discernible delay between successive images.

25

26   SUMMARY

1   The disclosed methods and systems provide control of at

2   least one camera to at least one network user. The camera(s) and

3   network users can be in communication with each other through a

4   network including the internet or a public or private network.

5   The network users can utilize a microprocessor-controlled device

6   that includes or displays an interface, including a graphical

7   user interface (GUI), database or scripting interface, menu

8   driven interface, etc., that can be collectively referred to

9   herein as an interface. The interface can provide data from

10   which camera control commands can be generated and transferred to

11   the camera. Additionally, the camera can provide video (and

12   audio) data for display or presentation to the network user. The

13   audio/video data can be provided in real-time using uncompressed

14   analog or digital streaming modes/formats to provide continuous

15   feedback to the network user.

16   The connection between the network user and the camera(s)

17   can facilitate communications via fiber optic, infrared,

18   satellite, Radio Frequency (RF), microwave, cable, or Internet

19   Protocol (IP), or other communications modes and/or protocols.

20   The interface can be provided by an applet or an

21   application. In one embodiment, the interface can have a control

22   area that can have a cursor within the control area. Movement of

23   the cursor within the control area can be translated to camera

24   controls. For one embodiment, the control area can be calibrated

25   such that continuous commands can be provided to the camera based

26   on the cursor position while the cursor is active. In one

1   embodiment, while the cursor is active, pan and tilt commands can

2   be provided to the robotic pan/tilt head to which the camera is

3   mounted, connected, or otherwise in communications. When the

4   cursor is inactive, camera commands may not be provided to the

5   camera. The interface can also have options for adjusting focus

6   and zoom.

7   In some embodiments, control commands can be mapped or

8   otherwise associated with keyboard features including keys,

9   and/or other peripheral devices including joysticks, control

10   panels, and touchscreens, using, for example serial cables (RS-

11   232, 422, 485), Universal Serial Bus (USB), FireWire, other

12   communications protocols and/or devices.

13   The disclosed methods and systems also include at least one

14   queue for administering control between the network users and the

15   cameras. Network users can request control of a camera, and

16   depending upon whether the network user is a subscriber or non-

17   subscriber, the network user can be provided or otherwise

18   associated with a camera control time interval, and placed in the

19   queue. Camera control can be determined from the queue position,

20   with a single user having control of a camera at a given time,

21   and for a given time interval that can be equal to the camera

22   control time interval associated with the user.

23   In some embodiments, a system administrator can establish

24   the control intervals for subscribers and non-subscribers. A

25   system administrator can also provide conditions or rules by

26   which queue position can be determined. Furthermore, a system

1   administrator can usurp control of the camera, remove a user from

2   the queue, and deny a request from a user by preventing a user

3   from obtaining position in a queue.

4   Other objects and advantages will become apparent

5   hereinafter in view of the specification and drawings.

6

7   BRIEF DESCRIPTION OF THE DRAWINGS

8   FIG. 1 is a block diagram presenting features of the methods

9   and systems disclosed herein;

10   FIG. 2 is a diagram of one embodiment for television

11   broadcasting;

12   FIG. 3 displays an alternate embodiment for the methods and

13   systems;

14   FIG. 4 presents one user interface for control of a

15   camera(s); and,

16   FIGs. 5A and FIG. 5B present illustrative interfaces for

17   providing queue status and control.

18

19   DESCRIPTION

20   To provide an overall understanding, certain illustrative

21   embodiments will now be described; however, it will be understood

22   by one of ordinary skill in the art that the systems and methods

23   described herein can be adapted and modified to provide systems

24   and methods for other suitable applications and that other

25   additions and modifications can be made without departing from

26   the scope of the systems and methods described herein.

1	For the purposes of the disclosed methods and systems,
2	references to a camera can include references to a camera system
3	that can include a robotically controlled camera and a robotic
4	pan/tilt head to which the camera can be connected, and a
5	processor that can control camera features including white/black
6	balance, iris, gain, RGB, phase, timing, SC, and other like
7	features that can be collectively referred to herein as camera
8	presets. In some embodiments, the camera includes a pan/tilt
9	head, while in other embodiments, the pan/tilt head can be
10	separate from the camera. Accordingly, in some embodiments,
11	references to camera as provided herein, can include references
12	to one or more processors (e.g., processor associated with the
13	camera and a processor associated with pan/tilt head; one
14	processor for the camera and the pan/tilt head, etc.).
15	The disclosed methods and systems include methods and
16	systems for providing real-time continuous streaming video and
17	audio data from at least one remote camera system and/or
18	location, to network users on a network such as the internet an
19	another public or private network. Furthermore, the methods and
20	systems allow the network users to interactively control the
21	cameras using continuous control methods and systems, wherein
22	continuous camera control can be understood herein to include
23	control commands provided at fixed intervals. The network users
24	can control camera pan, tilt, zoom, focus, and camera presets
25	using, in one embodiment, a user interface in the form of a
26	control or touch pad. In some embodiments, focus and zoom

6

1   controls can be provided using "rocker" type buttons on the user

2   interface that have up/down or +/- controls. In another

3   embodiment, for example, slider controls can be used for variable

4   speed control, and such examples are provided for illustration

5   and not limitation. The pan, zoom, focus, and tilt controls can

6   be fluid controls to allow control commands to be provided to the

7   camera(s) in a continuous manner as provided herein, for fluid

8   camera movement. The methods and systems can be employed in

9   television or network broadcast, cable, satellite, wireless,

10   and/or broadband applications, thereby enabling user

11   interactivity over network/internet connections, digital or

12   analog set-top boxes, and/or handheld wireless remote control

13   devices. In some embodiments, the methods and systems also

14   provide user queuing techniques to allow shared and ordered

15   control of the cameras by the network users. Administrative

16   usurping of camera control from network users can be allowed.

17   The methods and systems herein are not limited to the

18   communication channel by which the camera control and/or

19   video/audio streaming data can be communicated. Although

20   examples of communications channels can include fiber optic,

21   infrared, satellite, Radio Frequency (RF), microwave, cable,

22   Internet Protocol (IP), etc., such examples are provided for

23   illustration and not limitation.

24   Referring now to FIG. 1, there is an architectural block

25   diagram **10** providing features for the methods and systems

26   disclosed herein. Those with ordinary skill in the art will

1   recognize that FIG. 1, and other figures provided herein, can be

2   provided for discussion purposes to illustrate features of the

3   disclosed methods and systems. Accordingly, it can be understood

4   that such features or parts thereof, unless otherwise noted, can

5   be combined, further expanded upon with additional detail, and/or

6   otherwise eliminated, without departing from the scope of the

7   methods and systems.

8   FIG. 1 presents a system that includes a regional

9   distribution center **12** that can otherwise be understood as a

10   Network Operating Center (NOC). The center **12** can include one or

11   more encoders **14a, 14b**, that can accept uncompressed audio-video

12   input from one or more cameras **16a-16f**. The encoder outputs can

13   be input to an Internet Video Streaming (IVS) web server **18** and a

14   Direct Television (SDI/DTV) or MPEG (MPG) video server **20**. The

15   servers **18, 20** can communicate with a point-of-presence (POP)

16   server **22** to distribute audio-visual data from the cameras **16a-**

17   **16f** using IVS **24**, MPEG (MPG) **26**, or MPG/DTV **28** audio-video

18   formats. The audio-video formats can additionally be compatible

19   with Real Networks, Windows Media Player, Quicktime, MPEG-2,

20   etc., where such examples are provided for illustration and not

21   limitation. The audio-visual data from the cameras **16a-16f** can

22   additionally and optionally be presented to a video switcher **30**

23   and thereafter to a telephone communications provider or

24   television company **32** that can distribute compressed or

25   uncompressed audio-video data for broadcast in a format that can

1   include analog or digital television (SDI/DTV), including high-
2   definition digital television (HDTV) **34**.

3   The FIG. 1 cameras **16a-16f** can include, for example,
4   robotically controlled cameras that can be commercially available
5   from manufacturers including Panasonic, Sony, Canon, Pelco,
6   Hitachi, Fujinon, Phillips, JVC, and Sensormatic, with such
7   examples provided merely for illustration and not limitation. As
8   indicated previously, the cameras **16a-16f** can communicate
9   uncompressed audio and video data to the center **12** using fiber
10   optic cable, for example. The encoders **14a, 14b** can encode the
11   uncompressed video data for presentation to the servers **18, 20**
12   that can thereafter distribute the data over a network or other
13   communications link. Although the illustrated encoders **14a, 14b**
14   receive inputs from multiple cameras **16a-16f**, other embodiments
15   can include a one-to-one relationship between encoders **14a, 14b**
16   and cameras **16a-16f**.

17   The illustrated web server **18** can be equipped with software,
18   hardware, or a combination thereof, that can convert the data for
19   compatibility with MPEG 1/2/4, JPEG, M-JPEG, RTP, RTSP, or Java
20   Media Framework (JMF), or other formats that can be compatible
21   with, for example, a Quick Time server, a Real Player server, a
22   Windows Media server, or another server that can deliver audio-
23   video data over a network.

24   The illustrated video server **20** can also compress the
25   uncompressed audio-video data from the encoders **14a, 14b**, to
26   allow a format suitable for delivery over a network. As FIG. 1

1   illustrates, the POP server **22** can receive data from either the

2   web server **18**, the video server **20**, or both.

3   The illustrated servers **18, 20, 22** can be one or more

4   microprocessor-based systems including a computer workstation,

5   such as a PC workstation or a SUN workstation, handheld, palmtop,

6   laptop, personal digital assistant (PDA), cellular phone, etc.,

7   that includes a program for organizing and controlling the server

8   **18, 20, 22** to operate as described herein. Additionally and

9   optionally, the server **18, 20, 22** can be equipped with a sound

10   and video card or device for processing multimedia data. The

11   server **18, 20, 22** can operate as a stand-alone system or as part

12   of a networked computer system. Alternatively, the server **18,**

13   **20, 22** can be a dedicated device, such as an embedded system,

14   that can be incorporated into existing hardware devices, such as

15   telephone systems, PBX systems, sound cards, etc. In some

16   embodiments, servers **18, 20, 22** can be clustered together to

17   handle more traffic, and can include separate servers for

18   different purposes such as a database server, an application

19   server, and a Web presentation server. The server **18, 20, 22** can

20   also include one or more mass storage devices such as a disk farm

21   or a redundant array of independent disks ("RAID") system for

22   additional storage and data integrity. Read-only devices, such

23   as compact disk drives and digital versatile disk drives, can

24   also be connected to the server **18, 20, 22**. Additionally and

25   optionally, the client-server model is well known as a

26   relationship between a requester program, otherwise known as the

10

1 client, and the program that services the request, otherwise

2 known as a server **18, 20, 22**. It is also well-known that the

3 client and server **18, 20, 22** can reside on the same device, and

4 such understanding can be applied to the disclosed methods and

5 systems and to FIG. 1, where the servers **18, 20, 22** can also be

6 viewed as clients in the client-server model. As used herein,

7 the term "server" is intended to refer to any of the above-

8 described servers.

9   For a system according to FIG. 1, data from the cameras **16a-**

10 **16f** can be multiplexed and provide for lower bandwidth video that

11 can be viewed on conventional internet devices that can utilize

12 web browsers and/or at least one software application. The

13 multiplexed video data can be provided on-demand from the video

14 server **20** to data network users that, in one embodiment, utilize

15 Internet Protocol (IP). As indicated herein, the video data can

16 be distributed over private networks or public networks such as

17 the internet.

18   In some embodiments, the audio-video data from the cameras

19 **16a-16f** can be communicated using an intra-lata (local access

20 transport area) service that can otherwise be known as local

21 toll, regional, or zone service. The intra-lata service can also

22 be used for distributing the audio-video data from the center **12**

23 to the network.

24   Referring now to FIG. 2, there is a system **40** for coupling

25 or integrating a kiosk **42** to the center or NOC **12** and thereafter

26 to a broadcaster **44** to exchange data between the kiosk and the

1   broadcaster **44**.   In the FIG. 2 system, an IP device **46** can couple

2   at least one internet user **48** to the broadcaster **44** to receive

3   audio-video data from the kiosk **42**.   The broadcaster **44** can

4   optionally and additionally transfer the data through a

5   television broadcast.

6   The FIG. 2 kiosk **42** can include a robotic camera as

7   described previously herein.   Furthermore, the kiosk **42** can be

8   equipped with a video prompter, audio devices (microphones,

9   mixers, compressors, speakers, etc.), and a microprocessor-

10   controlled device that allows remote control of the camera,

11   lighting, LCD ticker, microphones, and other systems integrated

12   with the kiosk.   Accordingly, the internet users **48** can interact

13   (i.e., via IP control) with the broadcast from the kiosk **42** by

14   controlling the camera via a control server **50**.   The control

15   server **50** can allow control by providing a graphical user

16   interface, for example, to the users **48** to allow the users **48** to

17   control the kiosk camera(s) and hence interact with the

18   television broadcast.   The graphical user interface can be

19   provided, for example, using a Java applet or an application.

20   Referring now to FIG. 3, there is a block diagram **60** for

21   representing systems and methods that can be integrated with the

22   systems and methods of FIGs. 1 and 2.   Those with ordinary skill

23   in the art will recognize that FIGs. 1, 2, and 3, and other

24   Figures provided herein, can provide similar features of varying

25   detail.   Accordingly, as illustrated in FIGs. 2 and 3, the user

26   **48** can be understood to include an initiating device **62** that can

1   include a digital computer system that can utilize a wired or

2   wireless communications link to connect to a communication

3   network such as the internet. The user(s) **48** of the initiating

4   device **62** can utilize different peripheral devices that can be

5   integrated with or otherwise configured for compatible use with

6   the initiating device **62**. For example, the initiating device **62**

7   can include a keyboard, keypad, stylus, joystick, digital camera,

8   microphone, etc., that can communicate data to the initiating

9   device using wired or wireless communications systems and/or

10   protocols, etc. The initiating device **62** can be a

11   microprocessor-based system including a computer workstation,

12   such as a PC workstation or a SUN workstation, handheld, palmtop,

13   laptop, personal digital assistant (PDA), cellular phone, etc.,

14   that includes a program for organizing and controlling the

15   initiating device **62** to operate as described herein.

16   Additionally and optionally, the initiating device **62** can be

17   equipped with a sound and video card for processing multimedia

18   data. The initiating device **62** can operate as a stand-alone

19   system or as part of a networked computer system. Alternatively,

20   the initiating device **62** can be a dedicated device, such as an

21   embedded system, that can be incorporated into existing hardware

22   devices, such as telephone systems, PBX systems, sound cards,

23   etc. Accordingly, it will be understood by one of ordinary skill

24   in the art that the initiating device **62** described herein has

25   wide applicability and can be incorporated in many systems, and

26   realized in many forms.

13

1   For a system according to FIG. 3, the initiating device **62**

2   can be connected to a network such as the internet and can be

3   equipped with what is well-known as an internet "browser" such as

4   the commercially available Netscape Navigator, Internet Explorer,

5   etc., browsers, and those with ordinary skill in the art will

6   recognize that, depending upon the initiating device **62** and its

7   configuration, the browser can differ, and hence references

8   herein to a browser can include references to a user interface to

9   the internet or other network, wherein the methods and systems

10 herein are not limited to the browser or other network interface.

11 Furthermore, the initiating device **62** can access the internet

12 using wired or wireless communications links and/or protocols.

13 Referring again to FIG. 3, the user **48**, via the initiating

14 device **62**, can request information via a network from one or more

15 web servers **64**, for example. The illustrated web server **64** can

16 include features that have previously been described in relation

17 to the NOC **12** and the control server **50**. Additionally and

18 optionally, the web server **64** can include one or more applets

19 and/or applet tags **66** that can cause an applet on the web server

20 **64** or another server (or web server) to be communicated or

21 otherwise available to the initiating device **62**. For the methods

22 and systems disclosed herein, an applet or applet tag **66** can

23 provide at least one interface that, in the illustrated

24 embodiments is a graphical user interface (GUI), for display on

25 the initiating device **62**. Those with ordinary skill in the art

26 will recognize that the interface is not limited to an interface,

14

1 and can include, for example, database or scripting interface,

2 menu driven interface, etc., and accordingly references herein to

3 a or the interface can be understood to be references to an

4 interface that can operate according to the methods and systems

5 disclosed herein. For example, in a database interface, a camera

6 **16** can be positioned at predetermined locations at corresponding

7 times.

8 In one embodiment of the FIG. 3 systems and methods, an

9 interface can be manipulated or otherwise controlled by the user,

10 and the control can be communicated to the camera(s) **16**.

11 Furthermore, another applet **66**, or additionally and optionally,

12 an application residing on the initiating device **62**, can cause

13 the initiating device **62** to display or otherwise present

14 audio/visual data to the user **48** in a real-time continuous

15 streaming mode. The user **48** can, through the interface, control

16 the camera **16** with real-time continuous audio/visual feedback.

17 As indicated previously herein, in some embodiments, the web

18 server **64** can be a separate device or program from the control

19 server **50**, the NOC **12**, and other features of the web server **64**.

20 For example, in an embodiment, the control server **50** and NOC **12**

21 can be separate servers and can have separate processors that can

22 be in communication with the web server **64**. Additionally and

23 optionally, the NOC features **12** and the control server **50** can be

24 integrated with the initiating device **62** or one or more

25 processors related to or otherwise associated with the camera **16**.

26 Those with ordinary skill in the art will thus recognize that

1   there are various configurations of the FIG. 3 system that can be

2   employed without departing from the methods and systems provided

3   herein.

4   Referring now to FIG. 4, there is an illustration of one

5   interface that is a graphical user interface (GUI) **70** that can be

6   provided to the initiating device/user **62, 48** for controlling the

7   camera **16** according to a system of FIG. 3. The FIG. 4 interface

8   **70** can be presented with a window or other presentation of

9   audio/visual data such that the user **48** can view audio/video data

10   based on the camera **16** positioning, as the user **48** controls the

11   camera **16**.

12   The illustrated interface **70** includes a control pad or area

13   **72** that includes an origin designation **74** that, in the

14   illustrated embodiment, is a "+", although other origin

15   designations can be used. The control pad also includes a cursor

16   **76** that can be controlled by the user **48**. For example, in one

17   embodiment, the user **48** can control the cursor **76** by dragging the

18   cursor with a mouse, stylus, joystick, or other peripheral device

19   that can be integrated according to the methods and systems to

20   control the cursor **76**. In other embodiments, the cursor **76** can

21   be directed using voice commands or by utilizing an interface

22   that otherwise allows the cursor **76** to be positionally directed

23   within the control area **72**. In the illustrated embodiment, the

24   illustrated cursor **76** cannot leave the control area **72**.

25   The illustrated interface **70** can be calibrated or otherwise

26   configured such that when the cursor **76** is placed at the origin

1   **74**, the camera position remains fixed. Accordingly, for the

2   illustrated interface **70**, the control area **72** can be understood

3   to be continually relative to the current camera position.

4   Consequently, as the cursor moves from the origin **74**,

5   corresponding control commands can be generated and provided to

6   the camera **16** to allow continuous camera control and fluid camera

7   positional movement in the pan and tilt directions. These

8   directions can also be referred to as range and azimuth, or x and

9   y, and the disclosed methods and systems are not limited to a

10 choice of coordinate system or axes representation or labeling.

11   For purposes of discussion herein, camera **16** control can be

12 referred to as pan and tilt, where pan can be understood to be

13 left-right camera motion, while tilt can be understood to be

14 camera up-down motion. With regard to the illustrated control

15 area **72**, the control area **72** can be described with reference to

16 the cartesian coordinate system, such that left-right cursor **76**

17 motion can be referred to herein as motion in the "x" direction,

18 while up-down (tilt) movement can be referred to herein as cursor

19 motion in the "y" direction. Accordingly, for the illustrated

20 control area **72**, cursor **76** movement solely in the x direction,

21 along the x-axis origin **74**, translates to panning the camera **16**

22 with increased magnitude (speed) as the distance from the origin

23 increases. Similarly, for the illustrated control area **72**,

24 cursor **76** movement solely in the y direction, along the y-axis

25 origin **74**, translates to tilting the camera **16**, with increased

26 magnitude (speed) as the distance from the origin increases.

1   Furthermore, moving the cursor 76 in both the x and y directions

2   translates to camera 16 control in both the pan and tilt

3   directions.

4   The illustrated control area 72 can be calibrated such that

5   distance from the origin 74 in the x and y directions can be

6   translated into corresponding pan and tilt camera control

7   commands. The calibration and camera control commands can be

8   based on the camera 16, camera 16 type, camera interface, etc.

9   For example, in some embodiments, the control area 72 can be

10   understood to include a grid where the cursor 76 movement can be

11   measured based on the grid position. The grid may or may not be

12   visible to the user 48 via the interface 70.

13   For the illustrated systems and methods, camera control is

14   only provided when the cursor 76 is activated. As an example,

15   consider that a user "activates" the cursor 76 in the control pad

16   area 72 by selecting the cursor 76 with a computer mouse, and

17   subsequently drags the cursor 76 to a position that can be viewed

18   as one unit in the x-direction, and two units in the y-direction.

19   Based on the cursor 76 position, pan and tilt commands, or the

20   equivalent thereof, can be provided to the camera 16 (camera

21   driver(s)) based on the x and y cursor positioning. In some

22   embodiments that can be dependent upon the camera 16, camera

23   commands can be provided for diagonal movement of the camera 16,

24   or incremental pan and tilt movements can be provided to the

25   camera 16 to achieve the desired positioning. For the

26   illustrated systems and methods, should the user 48 maintain an

18

1 active cursor **76** at a fixed, non-origin position, camera commands

2 of the same magnitude and in a continuing process can be

3 transmitted to the camera **16**. Alternately, in the illustrated

4 embodiments, when the user **48** "deactivates" or inactivates the

5 cursor **76** in the control pad area **72**, including releasing a

6 computer mouse button, the illustrated cursor **76** can return to

7 the origin **74**, thereby ceasing the transmission of control

8 commands to the camera **16**. In an embodiment, deactivation of the

9 cursor **76** can cause the transmission of a "stop" command to the

10 camera **16**. In some embodiments, deactivating the cursor **76** can

11 cause the camera **16** to receive pan and tilt commands that do not

12 provide any camera **16** movement. Accordingly, one of ordinary

13 skill in the art will recognize that cursor positioning at the

14 origin **74** can provide an option to cease camera control command

15 transmission, or can equivalently cause camera control commands

16 to be transmitted that cause no camera **16** movement. Different

17 camera control commands can be generated from the illustrated

18 interface **70**, and in particular, the cursor **76** position,

19 depending upon camera **16** and other system requirements.

20   Accordingly, for the illustrated interface **70**, the further

21 the distance of the cursor **76** from the origin **74**, the greater the

22 magnitude of the camera control commands. In one embodiment, if

23 camera control commands are provided in a continuous manner, at

24 fixed intervals such as once every millisecond, based on the

25 cursor **76** position, greater magnitude commands can translate into

26 more rapid camera movement as the camera **16** can attempt to move a

19

1   greater distance in the same one millisecond command interval.

2   As indicated herein, the maximum camera control commands for one

3   camera **16** can be different from the maximum camera control

4   commands for another camera **16**, and hence the interface **70** can be

5   calibrated accordingly. In some embodiments, the same interface

6   calibration can be used for multiple cameras, with the

7   calibrations performed as the cursor position is translated to

8   camera commands.

9   As FIG. 4 also indicates, the interface **70** can include

10   options for focusing **78** and zooming **80** the camera **16**. Because

11   the illustrated focus **78** and zoom **80** features are not included in

12   the illustrated control area **72**, utilization of such features

13   implies that the control pad cursor **76** is deactivated or

14   inactivated and hence positioned at the origin **74**, thereby

15   indicating a non-mobile camera **16**. Although the illustrated

16   interface **70** does not include a visible cursor for the focus **78**

17   and zoom **80** areas, it can be understood that a cursor can be

18   activated for those areas **78, 80** when the user **48** depresses a

19   button in the illustrated regions **78, 80** or otherwise causes the

20   focus **78** and/or zoom **80** features to be enabled. For one

21   embodiment using the illustrated interface **70**, depressing a

22   computer mouse button in the focus or zoom areas **78, 80** can be

23   understood to be cursor activation, while releasing the computer

24   mouse button can be understood to be cursor inactivation. In

25   some embodiments, dual control of the cursor **76** and focus **78**

26   and/or zoom **80** features can be available, and in some

1   embodiments, the focus **78** and/or zoom **80** features can be combined

2   with the features of the control pad **72**.

3   Although not illustrated in FIG. 4, an interface or GUI for

4   the disclosed methods and systems can include controls for camera

5   presets, previously defined herein as camera settings or features

6   that can include white/black balance, iris, gain, RGB, phase,

7   timing, SC, and other like features.

8   As indicated previously, continuous camera control can be

9   understood herein to include control commands that can be

10   transmitted to the camera at fixed intervals for a given time

11   period. For example, as previously provided, camera commands can

12   be transmitted to the camera **16** while the cursor **76** is active,

13   and such commands can be sampled and/or transmitted at a rate of

14   once per millisecond. As also indicated herein, control commands

15   can vary, and can include, for example, pan, tilt, focus, zoom,

16   camera presets, or combinations thereof. Accordingly, in one

17   embodiment of the methods and systems herein, the given time

18   interval during which control commands can be generated can be,

19   for example, the time period during which the cursor **76** is

20   active. As indicated herein, for the illustrated interface **70**,

21   the cursor can be active in the control pad area **72**, or while

22   operating the focus **78** and/or zoom **80** features.

23   The illustrated interface **70** also includes a location preset

24   camera positioning option **82** such that a user can designate a

25   fixed camera position for future retrieval. The illustrated

26   interface **70** thus provides a drop-down box **82** that can retrieve

previously defined or stored camera positions. Selections of the predefined positions can cause appropriate camera commands to be transmitted to the camera **16**, to cause the camera **16** to be positioned at the desired, specified, and predefined position or location.

The FIG. 4 interface **70** also provides an option to exit **84**. When a user **48** selects the illustrated exit option **84**, the user **48** relinquishes control of the camera **16**. In some embodiments, exit **84** selection can cause the interface **70** to be eliminated from the user's display, while in other embodiments, exit **84** selection merely causes the user to relinquish camera control.

As indicated previously herein, the methods and systems include features for allowing more than one user **48** to control a camera **16** over a network interface. The illustrated methods and systems can implement a dynamic queuing feature that can facilitate the shared control. In the illustrated systems as provided in FIGs. 3 and 4, users **48** can subscribe to or otherwise register with the web server **64** or control server **50**. Such users **48** can, for example, be provided user names, accounts, passwords, and login information such that when the registered users **48** access the web server **64**, the users can be recognized as a subscriber or registrant. The methods and systems disclosed herein can also make features available to a system administrator of the web server **64** or the control server **50** that can allow the server(s) **64, 50** to provide designated features, capabilities, or privileges to subscriber users **48**. Alternately, a system

22

1   administrator can configure the methods and systems such that

2   non-subscriber users **48** may not be afforded or provided such

3   privileges. Accordingly, the methods and systems can allow

4   camera control options for subscriber users (e.g., pay-per-view

5   access), non-subscriber users, and system administrators.

6   In one embodiment of the illustrated systems and methods,

7   subscriber users can be provided priority regarding camera

8   control. Accordingly, for the illustrated embodiments, a camera

9   **16** can be controlled by only one user **48** at a single time.

10   Requests for camera control can hence be initiated by a user **48**

11   and received by the web server **64**, for example. Based on the

12   user's status as a subscriber or non-subscriber, the web server

13   **64** can generate a camera control queue that provides priority to

14   subscriber users **48**. Camera control can be for a specified time

15   interval, and camera control intervals for subscribers can be

16   different than camera control intervals for non-subscribers. In

17   some embodiments, camera control intervals can be based on the

18   number of requests. In an embodiment, camera control intervals

19   can be based on subscriber fees. Camera control interval

20   features can be configured by a system administrator.

21   Those with ordinary skill in the art will recognize that

22   there are various systems and methods for managing queues, and

23   such methods and systems can be designated by a system

24   administrator based on system requirements. In one embodiment,

25   non-subscriber requests may only be processed after subscriber

26   requests are fulfilled. Additionally and optionally, subscriber

23

1   camera control time intervals can be longer than non-subscriber

2   intervals. Once a camera control time interval expires, the user

3   48 can be automatically re-entered into the camera control queue.

4   Alternately, a user 48 who terminates (e.g., "exit" 84) the

5   camera control interval before expiration may not be re-entered

6   into the queue.

7   In some embodiments, subscriber requests may only take

8   precedence over non-subscriber requests at predefined times. In

9   an embodiment, the system administrator can usurp control of the

10   camera 16 from a user 48. Once the system administrator

11   relinquishes camera control, the requests for queuing can be

12   processed based on the queue status before the system

13   administration usurpation. A camera control interval associated

14   with the user 48 from which control was usurped by the system

15   administrator, can be suspended such that when the system

16   administrator relinquishes control, the user 48 from which camera

17   control was usurped can be credited with control and the

18   remaining camera control interval before the usurping.

19   In some embodiments, system administrators can remove a user

20   from the queue, and/or permanently deny a user of privileges.

21   Furthermore, a system administrator can usurp control from a

22   user, and thereafter prevent the camera control from returning to

23   that user. In an embodiment, system administrators do not have

24   time limits on camera control.

25   In some embodiments, users 48 can be provided with a display

26   of the current camera control user's remaining camera control

1   time interval. Such display can be represented as a reverse

2   stop-watch display. Users **48** can also be presented with a

3   display of the camera control queue order, where users can be

4   identified by login name or other specified identity data. Such

5   data can influence a user **48** to request control of one camera **16**

6   in contrast to requesting control of another camera **16** that may

7   have more requests.

8   An illustration of one display method or interface for the

9   methods and systems herein can be seen in FIGs. 5A and 5B. FIG.

10   5A displays an interface **90** wherein the user in control of the

11   camera **16** is called the "driver", and is identified as Guest_52.

12   The user being shown the display is known as Guest_58, and a

13   queue status display **92** can indicate the current driver and the

14   queue status that includes three parties, the associated queue

15   order for camera control for the three parties, and the time

16   allotted for the three parties. The display **90** also includes the

17   status of the current driver's time interval, and an option **94** to

18   allow the present user (i.e., Guest_58) to enter the queue.

19   FIG. 5B presents an interface **96** that allows a user to exit

20   the queue. The FIG. 5B an interface **96** is similar to the FIG. 5A

21   interface **90** and provides a queue status area **98** and a user-

22   selectable option to exit from the queue **100**.

23   When a user in the queue becomes the driver and is provided

24   camera control, the driver can be provided with both visual and

25   audio indications of such status. For example, in one

26   embodiment, the new driver can be provided an audio signal such

25

1   as a beep. Additionally and optionally, the driver's interface

2   and/or display can be altered to indicate control mode versus

3   queue mode.

4   For the illustrated systems and methods, a chat feature can

5   be simultaneously provided on the display that includes the

6   audio-visual data from the camera **16**. Users can accordingly

7   share comments and other data via the chat feature. The chat

8   feature(s) can allow real-time chat and can be implemented using

9   an applet or applet tag **66** that can be located on the web server

10   **64**. Based on the disclosed methods and systems, chat features

11   can be provided to internet users, television users, and other

12   system users.

13   The disclosed methods and systems can also be utilized to

14   allow the transmission, broadcast, and/or webcast of live

15   performances, or commercials, that can be understood herein as

16   LiveMercials. In one embodiment of LiveMercials, an advertiser

17   or sponsor can purchase or otherwise negotiate media space and/or

18   time on a network that utilizes the disclosed methods and

19   systems. The advertiser can determine the location and/or camera

20   from which to collect the audio/visual data, the target audience

21   to receive the collected data, the time to collect and/or

22   broadcast or distribute the data, and the format for the

23   audio/video data distribution. In some embodiments, audience

24   members can participate on-site and/or on-line using a real-time

25   ratings system that can provide real-time feedback from the

1 audience to the advertiser. As disclosed herein, a LiveMercial

2 can include audio and visual data.

3 In one example of LiveMercials, live auctions can be

4 performed by allowing products and/or services to be presented

5 for bidding by real-time, on-site and/or on-line audience

6 members.

7 Those with ordinary skill in the art will recognize that the

8 methods and systems disclosed herein can be platform independent

9 and can operate using a variety of operating systems. As

10 indicated previously, the methods and systems can also be

11 independent of the camera. As indicated herein, in some

12 embodiments, a user can be provided with a choice of cameras from

13 which to select, wherein the several cameras can be positionally

14 distinct.

15 What has thus been described are methods and systems for

16 providing fluid real-time camera control of at least one camera

17 to at least one network user via a network including the

18 internet. A control pad or area can be provided to camera users

19 via an application or applet that can be calibrated to provide

20 fluid camera control. Compressed or uncompressed analog,

21 digital, or streaming video and audio data can also be provided

22 to the users to allow real-time low latency continuous

23 audio/visual feedback. Multiple camera users can obtain control

24 of a camera using a dynamic queuing technique that can allow

25 single user camera control for certain time intervals. An

26 administrator can establish user camera control parameters

27

including camera control intervals for subscriber users versus non-subscriber users, camera usurping by an administrator, elimination of camera control privileges for a user, and denial of camera control requests by a user.

The methods and systems described herein are not limited to a particular hardware or software configuration, and may find applicability in many computing or processing environments. The methods and systems can be implemented in hardware or software, or a combination of hardware and software. The methods and systems can be implemented in one or more computer programs executing on one or more programmable computers that include a processor, a storage medium readable by the processor (including volatile and non-volatile memory and/or storage elements), one or more input devices, and one or more output devices.

The computer program(s) is preferably implemented using one or more high level procedural or object-oriented programming languages to communicate with a computer system; however, the program(s) can be implemented in assembly or machine language, if desired. The language can be compiled or interpreted.

The computer program(s) can be preferably stored on a storage medium or device (e.g., CD-ROM, hard disk, or magnetic disk) readable by a general or special purpose programmable computer for configuring and operating the computer when the storage medium or device is read by the computer to perform the procedures described herein. The system can also be implemented as a computer-readable storage medium, configured with a computer

28

1   program, where the storage medium so configured causes a computer

2   to operate in a specific and predefined manner.

3   Although the methods and systems have been described

4   relative to a specific embodiment thereof, they are not so

5   limited. Obviously many modifications and variations may become

6   apparent in light of the above teachings. For example, as

7   indicated previously herein, multiple cameras can be controlled

8   by a single user, and the multiple cameras can be of different

9   types with different connections (wired, wireless, satellite,

10   infrared, laser, etc.) between the user and the camera or

11   intermediate elements between the user and camera(s). Although

12   the interface presented herein for camera control included a GUI

13   with a cursor, other interfaces can be utilized that do not

14   utilize a cursor for camera control, and can use other graphics

15   or schemes to provide and/or demonstrate control features.

16   Although the illustrated interface included an origin designation

17   in the center of the interface, the origin can be at a different

18   location in the interface. Furthermore, in some embodiments, an

19   origin designation may not be included, and cursor activation can

20   occur by, for example, clicking a computer mouse in the control

21   area. Although the illustrated interface also included buttons

22   for increasing and decreasing focus and zoom, other methods for

23   generating focus and zoom commands can be provided. The user

24   interface can be, for example, text-based or menu driven in some

25   embodiments, rather than graphical.

1   Many additional changes in the details, materials, and

2 arrangement of parts, herein described and illustrated, can be

3 made by those skilled in the art. Accordingly, it will be

4 understood that the following claims are not to be limited to the

5 embodiments disclosed herein, can include practices otherwise

6 than specifically described, and are to be interpreted as broadly

7 as allowed under the law.